

REMARKS

Applicants respectfully request reconsideration of this application in view of the foregoing amendments and the following remarks.

Claim Status

Claims 1-34 are pending in this application. Claims 1-8, 10-13, 18-25 and 31-34 have been rejected, and claims 9, 14-17 and 26-30 have been objected to by the Examiner. Claim 10 has been canceled without prejudice. Claims 1, 5, 18, and 34 are herein amended. No new matter has been added by these amendments.

Objections to the Specification

The Examiner requested that the Applicants update the status of the patent applications listed throughout the specification.

Applicants have amended the specification to update the status of the patent applications listed throughout the specification. Accordingly, reconsideration and withdrawal of this objection is respectfully requested.

Objections to the Drawings

The drawings have been objected to as failing to comply with 37 C.F.R. § 1.84(p)(4) because the reference character “124” in FIG. 1 has been used to designate both an eye tracking device and an unlabeled box.

FIG. 1 has been amended so that the reference character “124” designates only an eye tracking device.

The drawings have also been objected to as failing to comply with 37 C.F.R. § 1.84(p)(4) because: “a) reference characters ‘131’ in FIG. 4 and ‘410’ in the specification have both been used to designate the fly-around step”; “b) reference characters ‘132’ in

FIG. 4 and '420' in the specification have both been used to designate the flicker step";
"c) reference characters '133' in FIG. 4 and '430' in the specification have both been
used to designate the interaction step"; and "d) reference characters '134' in FIG. 4 and
'440' in the specification have both been used to designate the slice scrolling step."

FIG. 4 has been amended to include the reference characters "410", "420", "430"
and "440".

In addition, the drawings have been objected to as failing to comply with 37
C.F.R. § 1.84(p)(5) because they include the following reference sign(s) not mentioned in
the description: "A" in FIGS. 2 and 3.

The specification has been amended to describe the reference sign "A" in FIGS. 2
and 3.

The drawings have been further objected to as failing to comply with 37 C.F.R. §
1.84(p)(5) because they do not include the following reference sign(s) mentioned in the
description: a) "500" in FIG. 5, and b) "600" in FIG. 6.

FIGS. 5 and 6 have been amended to include the reference signs "500" and "600"
respectively.

Based on the above amendments, reconsideration and withdrawal of the
objections to the drawings is respectfully requested.

Claim Objections

Claims 5 and 34 have been objected to under 37 C.F.R. § 1.75(a) as failing to
particularly point out and distinctly claim the subject matter which the applicant regards
as his invention.

With regard to claim 5 the Examiner has indicated that the claim language “at least some of” is vague and indefinite, and requested clarification of this claim language.

Applicants have amended claim 5 to recite, “... wherein the quantitative measurements comprise at least ~~some~~ one of a diameter, a volume, a sphericity, a circularity, and an average intensity of the anatomical structure of interest.”

With regard to claim 34 the Examiner has indicated that there is insufficient antecedent basis for the limitation “said determining step” and has interpreted the limitation to recite, “said generating step” for examination purposes.

Applicants have amended claim 34 to recite, “... estimating, in real-time, a likelihood, when the anatomical structure of interest is potentially adverse, based on predefined criteria and the quantitative measurements; and generating, in real-time, a warning, when the likelihood is potentially adverse.”

Claims 1-34 have been objected to under 37 C.F.R. § 1.75(d)(1) as failing to find clear support or antecedent basis in the description. In particular, the Examiner indicated that “predefined criteria” recited in claims 1, 18 and 34 is not clearly described in the specification, and thus, requested clarification thereof.

Applicants respectfully disagree with the Examiner’s assertion that “predefined criteria” is not clearly described in the specification. As is known to one having ordinary skill in the art, “predefined criteria” refers to, for example, a predefined set of rules, a standard or a test on which a judgment or decision can be based. Accordingly, “predefined criteria” as recited in the specification and claims refers to, for example, a predefined set of rules that relate the quantitative measurements to the likelihood

estimate, where the predefined set of rules are derived from anatomical knowledge (see page 4, line 17 – page 5, line 9 and page 15, line 24- page 16, line 1).

Based on the above amendments, reconsideration and withdrawal of the objections to the claims is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 2, 4-8, 11-13, 18, 19, 21-25, and 31-34 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over the combination of U.S. Patent No. 6,556,696 (Summers) and U.S. Patent No. 6,630,937 (Kallergi). Claims 3 and 20 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over the combination of Summers and Kallergi in further view of U.S. Patent No. 6,119,003 (Spigelman). Claim 10 has been rejected under 35 U.S.C. § 103 (a) as being unpatentable over the combination of Summers and Kallergi in further view of U.S. Patent Application No. 2002/0006216 (Armato).

As will be explained below, Applicants respectfully submit that the claims as amended, in particular independent claims 1 and 18, are neither taught, disclosed nor suggested by Summers, Kallergi, Spigelman, and Armato or a combination thereof.

The present invention as recited in amended claim 1 is directed to a computer-assisted diagnosis method for assisting diagnosis of anatomical structures in a digital volumetric medical image of at least one lung that comprises,

identifying an anatomical structure of interest in the volumetric digital medical image; automatically segmenting, in real-time, the anatomical structure of interest in a predefined volume of interest (VOI); automatically computing, in real-time, quantitative measurements of the anatomical structure of interest, and executing a segmentation method that adaptively adjusts a segmentation threshold based on a local histogram analysis

to determine an extent of the structural object of interest; displaying, in real-time, a result of said segmenting step and a result of said computing step; estimating, in real-time, a likelihood that the anatomical structure of interest corresponds to a disease or an area warranting further investigation, based on predefined criteria and the quantitative measurements; and generating, in real-time, a warning, when the likelihood is above a predefined threshold.

According to the present invention as recited in claim 1, during the step of automatically computing, in real-time, quantitative measurements of the anatomical structure of interest, a segmentation method that adaptively adjusts a segmentation threshold based on a local histogram analysis to determine an extent of the structural object of interest is executed. The segmentation method employed by the present invention uses an adaptive threshold technique based upon a local histogram analysis to segment the object of interest. In the adaptive threshold technique, a threshold such as an optimal threshold, is adjusted and/or selected using the local histogram of the image. After performing the adaptive threshold technique a connected components analysis is performed using the adjusted threshold.

Although the Examiner indicated, “[the] segmentation method that adaptively adjusts segmentation thresholds based on local histogram analysis to determine an extent of the structural object of interest” was not taught by Summers, Kallergi or a combination thereof, he did indicate, however, that Armato “... discloses a segmentation method that uses adaptive thresholds based on local histogram...” Applicants respectfully disagree with the Examiner’s statement regarding Armato.

For example, Armato discloses using a multiple gray-level thresholding technique, which is then applied to a gray-level histogram of an area. In particular,

Armato uses 36 pre-selected threshold values and then performs a connected components analysis. In contrast to the present invention, Armato does not teach a segmentation method that adaptively adjusts a segmentation threshold based upon a local histogram analysis to determine an extent of the structural object of interest. Rather, Armato uses a multiple gray-level threshold technique, which uses, for example, 36 pre-selected threshold values instead of an adjusted threshold value, and then performs a connected components analysis at each of the 36 values.

Accordingly, Applicants believe the present invention as recited in amended claims 1 and 18 is not taught or suggested by Summers, Kallergi, Spigelman, and Armato or a combination thereof. As such, Applicants believe that the invention is patentable over the cited art.

Applicants respectfully acknowledge the Examiner's indication that claims 9, 14-17 and 26-30 would be allowable if rewritten in independent form to include the limitations of their base claims and any intervening claims. Accordingly, Applicants have incorporated essentially the features of claim 14 into claim 34 to place claim 34 in condition for allowance.

Dependent Claims

Applicants have not independently addressed the rejections of the dependent claims because Applicants submit that, in view of the amendments to the claims presented herein and, for at least similar reasons as why the independent claims from which the dependent claims depend are believed allowable as discussed, *supra*, the dependent claims are also allowable. Applicants however, reserve the right to address

any individual rejections of the dependent claims should such be necessary or appropriate.

CONCLUSION

Accordingly, Applicants submit that the claims as herein presented are allowable over the prior art of record, taken alone or in combination, and that the respective rejections be withdrawn. Applicants further submit that the application is hereby placed in condition for allowance which action is earnestly solicited.

Respectfully submitted,

By: Donald B. Paschburg
Donald B. Paschburg
Reg. No. 33,753
Attorney for Applicants

Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, New Jersey 08830
Tel: (732) 321-3191
FAX: (732) 590-1278